

Work Order ID 163663

Wednesday, July 05, 2017 10:24:11 AM

163663

N9nm4n1m

Page 1

Item ID: D350-748-101

Accept

Revision ID:

Item Name: Fwd Crosstube AS350 / AS355

Start Date: 7/5/2017

Start Qty: 1.00

Required Date: 8/17/2017

Req'd Qty: 1.00

Reference:

1

Cust Item ID:
Customer:

Stop *NS*

Setup Start *NS1*

Approvals: Process Plan: 21

Date: JUL 05 2017

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID Tool # Plan
Code

Accept Qty Reject Qty Reject Number Insp.
Stamp

Draw Nbr Revision Nbr

D350-748-141 H

100

Document Control

0.00

1111

DOCUMENT CONTROL

DC

Memo

0.00

Doc. Control -USB or Paperwork

Photocopy bluefile & type labels per PPPD350-748-101

CHG004

110

1111

BENDING MACHINE - CROSSTUBES

1.08

CNC Bend 1

Memo

0.90

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

****UNDER BEND .225" PER SIDE****

****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

****VERIFY CROSSTUBE DIMENSIONS AS PER DWG****

19.0705



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

DISPOSITION		AGAINST DEPARTMENT/PROCESS			
Work Order: _____	Suspected Unapproved	Skid-tube	Cross tube	Water Jet	Engineering
Part No. _____		Machining	Small Fab	Prod. Eng. Coord.	Quality
NCR No. _____		Thermoforming	Finishing	Rec/Store/Packaging	Other
Date: _____		Supplier			
Step #: _____		QTY Effective : _____			
Description Work Order Deviation		Disposition			
Root Cause		FAULT CATEGORY			
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/Program	Positioned Wrong
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect
Handling/Pre	Training	Crimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Misread
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence
Past Expiry Date	Manufacturing Process				
Misidentified	Past Due				
OTHER : _____					
Completed By		Lead hand / Supervisor Approval Verification			
QC / QA Coordinator Approval					

H:/FORMS/Quality Assurance/approved QA/NCRWO Rev I

Work Order ID 163663
Wednesday, July 05, 2017 10:24:11 AM

163663

Page 3

Item ID: D350-748-101 Accept *N900040100* Setup Start *NS1*
Revision ID: Fwd Crosscube AS350 / AS355 Stop *NS2*
Item Name: Fwd Crosscube AS350 / AS355
Start Date: 7/5/2017 Start Qty: 1.00 *1*
Required Date: 8/17/2017 Req'd Qty: 1.00 *1*
Reference: Cust Item ID:
Customer:

Approvals: Process Plan: Date: Tooling: Date: Run Start *NR1*
QC: Date: SPC (V/N): Date: Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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128 *128*
Crosscubes
Memo 1.22
CUT TUBE AT HEIGHT ON FAI SHEET
VERF HEIGHT 23.15 BY QC 15 LEVEL INSPECTOR
VERF TWIST 0.181" BY QC 15 LEVEL INSPECTOR

130
Crosscubes
Memo 0.00
Crosscubes
Memo 1.24

- 2- Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010
- 3- Deburr
- 4- Engrave Part # and Batch # as per Dwg D350-748-141
- 5- Remove all marks from tube within limits of D350-748-141
- 6- Apply a light coat of LPS3 on the interior of tube
Batch: _____

GP 17-07-13

17-03

012 17-07-12

DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No.: _____ NCR No.: _____ Date: _____		DISPOSITION ☐ Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐ Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other		AGAINST DEPARTMENT/PROCESS _____		MRB (QSI042) Approval _____																																																																																																																															
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Work Order ID 163663

Wednesday, July 05, 2017 10:24:11 AM

163663

Page 4

Item ID: D350-748-101

Accept

Revision ID:

N9000040100

Setup Start

NS1

Item Name: Fwd Crosshatch AS350 / AS355

Stop

NS2

Start Date: 7/5/2017

Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/17/2017

Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID Tool # Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

140 QC5- Inspect part completeness to step on W/O

0.00

14N

Memo

0.02

CHECK 10 DEG HOLES WITH DT876E (EUROCOPTER CLAMP)

JUL 13 2017

QC

Quality Control

150

15N

Outsource3

Outsource process-Cad plate per QS1017 4.1.9.1

0.00

Memo

360.00

Outsource process - Cad plate

Issue P/O: 322645

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadmium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

0.00

160

16N

Packaging

Receive & Inspect for Damage & Mat'l Certs

0.00

Memo

0.02

Packaging

Ensure certificate of conformity is attached

1X SP17-7-25

DAS
13
9-08

10/12/2017

DAS
38
9-08



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____		DISPOSITION		AGAINST DEPARTMENT/PROCESS			
Part No. _____		Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐			
NCR No. _____		Step #: _____		Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date: _____		QTY Effective: _____		MRB (QSI042) Approval			
Description Work Order Deviation				Disposition			
Root Cause				FAULT CATEGORY			
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐		
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐		
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐		
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐		
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐		
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐		
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐		
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐		
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐		
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐		
Past Expiry Date ☐	Manufacturing Process ☐						
Misidentified ☐	Past Due ☐						
		OTHER: ☐					
				Completed By			
				Lead hand / Supervisor Approval Verification			
				QC / QA Coordinator Approval			

Work Order ID 163663

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1636663

Item ID:	D350-748-101	Accept	*N9000040100*	Setup	Start	*NS1*
Revision ID:				Stop		*NS2*
Item Name:	Fwd Crosstube AS350 / AS355					
Start Date:	7/5/2017	Start Qty:	1.00			
Required Date:	8/17/2017	Req'd Qty:	1.00			
Reference:						

Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start	*NR1*
	QC:	Date:	SPC (Y/N):	Date:	Stop		*NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
170	QC6- All purchased or subcontracted products	0.00							
177N	QC								
Quality Control	Memo	0.02							
174	Outsource process - NDT per QSI038 4.1	0.00							
177L	Outsource2								
Outsource process - NDT	Memo	48.00							
	ISSUE P/O TO ACUREN:								

176 Receive & Inspect for Damage & Mar'l Certs 0.00

177G Packaging Memo 0.02

Packaging

PTO

JUL 13 2017 11:09

18 June 2014

DQA: _____ Date: _____
QA Closed: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

Work Order update only ☐

Work Order: <u>163663</u>		AGAINST DEPARTMENT/PROCESS	
Part No. <u>DB50-748-101</u>		Engineering ☐ Quality ☐ Other ☐	
NCR No. <u>19-7171</u>		Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐	
Date: <u>17-07-25</u>		QTY Effective: <u>2</u>	
Step #: <u>170</u>		Disposition	
Description Work Order Deviation		Perform LPI and ECT to det determine location and depth of crack and get approval if cross tube is scrap or can be rework part ICA-DB50-748	
cross tube fail MPI		Completed By <u>DAS</u> 17-08-21	
		Lead Hand / Supervisor Approval Verification <u>DAS</u> 9 9-88 17-08-21	
		QC / QA Coordinator Approval <u>DAS</u> 9 9-88 17-08-21	
Root Cause		FAULT CATEGORY	
Environment ☐	No Re-verification ☐	Temperature/Cure ☐	Positioned Wrong ☐
Design ☐	Operator ☐	Set-up ☐	Outside Dimensions ☐
Doc/Data ☐	Offset/Setup ☐	BOM/Route ☐	Over/Under tolerance ☐
Equip/Tooling ☐	Supplier ☐	Broken/Damage/Defect ☐	Part Incorrect ☐
Handling/Pre ☐	Training ☐	Inspection Incomplete/Unqualified ☐	Part Lost/Missing ☐
Material ☒	Use for Testing ☐	Contamination ☐	Part Moved ☐
Internal Transport ☐	Poor Information ☐	Countersink ☐	Drawing ☐
Tribal Knowledge ☐	Rushing ☐	Cut Too Short ☐	Finish ☐
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Substation ☐	Process Improvement ☐	Drill Holes ☐	Turning Sequence ☐
Past Expiry Date ☐	Manufacturing Process ☐		
Misidentified ☐	Past Due ☐		
OTHER: _____			

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Item ID:	D350-748-101	Accept	*N900040100*	Setup	Start	*NS1*
Revision ID:						
Item Name:	Fwd Crosstube AS350 / AS355				Stop	*NS2*
Start Date:	7/5/2017	Start Qty:	1.00			
Required Date:	8/17/2017	Req'd Qty:	1.00			
Reference:						
Customer:						

Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start	*NR1*
	QC:	Date:	SPC (V/N):	Date:		Stop	*NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
178	QC5-Inspect part completeness to step on W/O	0.00							
178	QC								
Quality Control	Memo	0.02							
179	Pressure Wash per QSI005 4.3	0.00							
179	Hand Finish								
Hand Finishing	Memo	0.00							



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____		DISPOSITION		AGAINST DEPARTMENT/PROCESS									
Part No. _____		Rework Scrap Use-as-is		Cross tube Small Fab Finishing Composite									
NCR No. _____		Suspected Unapproved		Skid-tube Machining Thermoforming Large Fab									
Date : _____		Step #:		QTY Effective :									
Description Work Order Deviation		Disposition											
Completed By		Lead hand / Supervisor Approval Verification											
QC / QA Coordinator Approval													

Root Cause		FAULT CATEGORY									
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/Surge	Positioned Wrong						
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions						
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance						
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect						
Handling/Pre	Training	Crimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing						
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved						
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing						
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish						
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Misread						
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence						
Past Expiry Date	Manufacturing Process										
Misidentified	Past Due										
OTHER :											

Wednesday, July 05, 2017 10:24:11 AM

163663

Accept

N900040100

Setup Start *NS1*

**Stop
*NCS***

1

Cust Item ID:

*** 1 ***

Customer:

Approvals: Process Plan:

Date: _____ **Tooling:** _____

Date:

Run Start

NR1

QC: _____ Date: _____ SPC (Y/N): _____

Date:

Stop

NR

Operation Description

Set Up/
Run Hours

Tool ID	Tool #	Plan	Code
---------	--------	------	------

**Accept
Qty**

Reject
OtyReject
Number

Insp.

180 Spray Painting per QSI005 4.2

00.0

120
Spray Paint

Memo

1.49

Spray Painting

***VERIFY BY BATCH # TO MATCH W/O

***VERIFY BY _____ PART # TO MATCH
W/O _____

MASK SCRIBE B# & P# AND VERIFY

**1-Prime inside and out crosstube as per QSI 005 4.2
BATCH:**

2-Paint Outside of Tube as per Dart QSI 005 4.2
BATCH:

190 QCI4-Inspect Spray Paint

00:00

1998

Memo

0.01

Quality Control

Then, Wrap in plastic bag to protect from scratches

*****VERIFY BY BATCH# TO MATCH W/O**

*****VERIFY BY** _____ **PART # TO MATCH**



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____		DISPOSITION		AGAINST DEPARTMENT/PROCESS									
Part No. _____		Rework Scrap Use-as-is Suspected Unapproved		Skid-tube Machining Thermoforming Large Fab		Cross tube Small Fab Finishing Composite		Water Jet Prod. Eng. Coord. Rec/Store/Packaging Supplier		Engineering Quality Other			
NCR No. _____													
Date: _____		Step #: _____		QTY Effective: _____						MRB (QS1042) Approval			
Description Work Order Deviation				Disposition									
												Completed By	
												Lead hand / Supervisor Approval Verification	
												QC / QA Coordinator Approval	
Root Cause				FAULT CATEGORY									
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/ Surge	Positioned Wrong								
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions								
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance								
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect								
Handling/Pre	Training	Grimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing								
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved								
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing								
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish								
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Misread								
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence								
Past Expiry Date	Manufacturing Process												
Misidentified	Past Due												
OTHER: _____													

Work Order ID 163663

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163663

Item ID:	D350-748-101	Accept	*N9000040100*	Setup	Start	*NS1*
Revision ID:				Stop		*NS2*
Item Name:	Fwd Crosstube AS350 / AS355					
Start Date:	7/5/2017	Start Qty:	1.00	*1*		
Required Date:	8/17/2017	Req'd Qty:	1.00	*1*		
Reference:						

Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start	*NR1*
	QC:	Date:	SPC (Y/N):	Date:	Stop		*NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

200	Crosstubes	0.00							
-----	------------	------	--	--	--	--	--	--	--

200

Crosstubes

Memo

2.44

INSTALL GROUND WIRE INSERT, THEN INSERT SCREW AND WASHER

1-Abraide mating surfaces of support and crossstube with 180 grit sandpaper, clean the area with MEK or equivalent as per dwg

2-Install supports with Proseal 890 per D350-748-141 and QSI 015

A/R Proseal 890 Batch: EXP:

3-Install supports clamps Using D18876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS. PROSEAL CURE TIME 72 HOURS: Start: Finish:

RE-CHECK TORQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS AS PER DWG.

H:/FORMS/Quality Assurance/approved QA/NCRWO Rev I

Work Order ID 163663

163663

Wednesday, July 05, 2017 10:24:11 AM

Item ID: D350-748-101

Accept

Revision ID:

N9000040100

Setup Start

NS1

Item Name: Fwd Crosstube AS350 / AS355

Stop

NS2

Start Date: 7/5/2017 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/17/2017 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start

NR1

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

210 QC5- Inspect part completeness to step on W/O

0.00

210

Memo 0.02

Quality Control ***RE-CHECK TORQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS AS PER DWG.***

***VERIFY BY _____ BATCH # TO MATCH W/O

***VERIFY BY _____ PART # TO MATCH W/O

220 Pick Kit

0.00

220

Memo

0.00

Packaging

Date:

Work Order update only

[illegible]

Work Order ID 163663

Wednesday, July 05, 2017 10:24:11 AM

163663

Item ID: D350-748-101

Accept

Revision ID:

Item Name: Fwd Crossstube AS350 / AS355

Start Date: 7/5/2017

1

Required Date: 8/17/2017

1

Reference:

N900040100

Setup Start

NS1

Stop *NS2*

Cust Item ID:

Customer:

Approvals: Process Plan: _____ Date: _____ Tooling: _____

QC: _____ Date: _____ SPC (Y/N): _____

Date: _____ Date: _____

Run Start

NR1

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID Tool # Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

230 QC4-100% inspect kits for completeness

0.00

230

QC

Memo
***VERIFY BY _____ BATCH # TO MATCH W/O

***VERIFY BY _____ PART # TO MATCH
W/O _____

240

240

Packaging

Identify as per dwg & Stock Location: _____

0.00

Memo

Identify and pack for shipping as per PPP D350-748-101
Location: FG035

250

250

QC

QC21- Final Inspection - Work Order Release

0.00

Memo

0.10

Quality Control



DMS
21
9-88

AUG 24 2017

DQA:

Date: _____

QA Closed:

Date: _____

WORK ORDER NON-CONFORMANCE / UPDATEWork Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION ☐ Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐ Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other	AGAINST DEPARTMENT/PROCESS	MRB (QS1042) Approval
Date: _____ Step #: _____		QTY Effective : _____	
Description Work Order Deviation		Disposition	
Completed By		Lead hand / Supervisor Approval Verification	
QC / QA Coordinator Approval		MRB (QS1042) Approval	

Root Cause		FAULT CATEGORY									
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/Surge	Positioned Wrong						
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions						
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance						
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect						
Handling/Pre	Training	Crimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing						
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved						
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing						
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish						
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Mistread						
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence						
Past Expiry Date	Manufacturing Process										
Misidentified	Past Due										
		OTHER : _____									

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

163663

Parent Item: D350-748-101

D350-748-101

Parent Item Name: Fwd Crossstube AS350 / AS355

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev:A New Issue 06-07-05 JLM
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
 BY:DD
 IPP Rev:C Rev B 07-11-15 DD
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:E 08-06-24 revd as per dwg DD verified by:EC
 10.08.04 added QSI010 4.3 DD verified by:EC
 IPP Rev:F
 IPP Rev:G ADD UNDER BEND COMMENT 12-05-28 JLM
 REV:H 12.11.05 as per dwg D350-748-141G DD verified by:JLM
 15.03.19 as per dwg D350-748-141revH dd verified by:JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	----------------	--------------	---------------	----------------	--------

D350-748-141TRN
D350-748-141TRN
 Crossstube Turning Detail

**

Web 17/07/05

Location	Loc Qty	Loc Code
HALL	11	
130790	0	
158695	1	
158696	1	
158697	1	
158699	1	
158700	1	
158701	1	
158716	1	
158717	1	
158718	1	
158719	1	
158720	1	

DQA:

Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION ☐ Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐ Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other		AGAINST DEPARTMENT/PROCESS		MRB (QS1042) Approval	
Date: _____		Step #: _____		QTY Effective: _____			
Description Work Order Deviation			Disposition				
Completed By			Lead hand / Supervisor Approval Verification				
QC / QA Coordinator Approval			MRB (QS1042) Approval				

FAULT CATEGORY																																																			
Root Cause			Temperature/Cure				Power Loss/Surge																																												
☐ Environment	☐ Design	☐ Doc/Data	☐ Equip/Tooling	☐ Handling/Pre	☐ Material	☐ Internal Transport	☐ Tribal Knowledge	☐ LOA	☐ Substation	☐ Past Expiry Date	☐ Misidentified	☐ Pressure/Forced	☐ Bending	☐ Centre Not Concentric	☐ Cracks	☐ Crimp/Kink/Ripple/Wave	☐ Cuffs	☐ Crushing	☐ Heat Treat	☐ Wave/Twist in Tube	☐ Marks/Chatter	☐ Temperature/Cure	☐ Set-up	☐ BOM/Route	☐ Broken/Damage/Defect	☐ Inspection Incomplete/Unqualified	☐ Contamination	☐ Countersink	☐ Cut Too Short	☐ Instructions Incomplete/Unclear	☐ Drill Holes	☐ Power Loss/Surge	☐ Folio/Program	☐ Grain	☐ Weld	☐ Wrong Stock Pulled	☐ Out of Sequence	☐ Off-set	☐ Mislabeled	☐ Fit/Function	☐ Misaligned/off center	☐ Positioned Wrong	☐ Outside Dimensions	☐ Over/Under tolerance	☐ Part Incorrect	☐ Part Lost/Missing	☐ Part Moved	☐ Drawing	☐ Finish	☐ Misread	☐ Turning Sequence
												OTHER: _____																																							

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

Parent Item: D350-748-101

Parent Item Name: Fwd Crosstube AS350 / AS355

163663

D350-748-101

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

ALS4-1032-225

AEI-S8-1032-225

Purchased

No

200

Each

2,620.000

1

1

ALS4-1032-225

**

Rivnut

Location

Loc Qty

Loc Code

FG

M134975

55

M135998

20

M136579

5

FP001

30

M135603

2200

M135920

40

M135998

38

ST556

M136265

2111

M136579

11

MS21920-20

Purchased

No

200

Each

146.0000

2

2

MS21920-20

**

Clamp

Location

Loc Qty

Loc Code

FG

122254

2

LG050

m137361

142

m137587

17

m137710

50

m137820

25

LG056

m128650

2

m132675

1

m132675

1

DQA: _____ Date: _____

QA Closed: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATEWork Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Cross tube ☐ Water Jet ☐ Engineering ☐ Small Fab ☐ Prod. Eng. Coord. ☐ Quality ☐ Finishing ☐ Rec/Store/Packaging ☐ Other ☐ Composite ☐ Supplier ☐							
Date : _____		Step #: _____		QTY Effective : _____							
Description Work Order Deviation		Disposition		MRB (QS1042) Approval							
								Completed By			
								Lead hand / Supervisor Approval Verification			
				QC / QA Coordinator Approval							

Root Cause		FAULT CATEGORY									
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/Surge	Positioned Wrong						
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions						
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance						
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect						
Handling/Pre	Training	Crimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing						
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved						
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing						
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish						
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Misread						
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence						
Past Expiry Date	Manufacturing Process										
Misidentified	Past Due										
		OTHER : _____									

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

Parent Item: D350-748-101

Parent Item Name: Fwd Crosstube AS350 / AS355

163663
D350-748-101

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

170.0000

1

1

**

MS27039-1-10

SCREW

Location

Loc Qty

Loc Code

GA

15

m129541

15

over006

119

m137736

119

ST280

36

m137164

6

m137597

30

200

Each

104.0000

2

2

**

D5123-7

Manufactured

No

D5123-7

Clamp Cushion

Location

Loc Qty

Loc Code

LG052

104

151551

12

153236

92

200

Each

58.0000

2

2

**

D3502-1

Manufactured

No

D3502-1

Support

Location

Loc Qty

Loc Code

LG052

58

150010

14

150683

2

158881

20

161764

22

DQA:

Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐				Date: _____ Step #: _____ QTY Effective : _____		MRB (QS1042) Approval													
Description Work Order Deviation						Disposition																	
Completed By						Lead hand / Supervisor Approval Verification						QC / QA Coordinator Approval											
Root Cause												FAULT CATEGORY											
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐				No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐				Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐				Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐				Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐				Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : _____																							

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

Parent Item: D350-748-101

Parent Item Name: Fwd Crosstube AS350 / AS355

163663
D350-748-101

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

NAS1149D0363J

Purchased

No

200

Each

631.0000

1

1

NAS1149D0363.J

Washer

**

Location

Loc Qty

Loc Code

GA

43

m134055

13

m137164

30

ST263

588

m137587

588

AN4-6A

Purchased

No

220

Each

551.0000

16

16

AN4-6A

BOLT

**

Location

Loc Qty

Loc Code

ST345

551

M137464

551

D3500-1

Manufactured

No

220

Each

40.0000

4

4

D3500-1

Saddle

**

Location

Loc Qty

Loc Code

ST406

40

158741

40

NAS1149D0463J

Purchased

No

220

Each

3,313.000

32

32

NAS1149D0463.J

Washer

**

Location

Loc Qty

Loc Code

GA

40

M135056

40

ST260a

2000

M137699

2000

ST263

1273

M137371

1273

Wednesday, July 05, 2017 10:24:14 AM

Shop Packet Print

DQA:

Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date: _____

Work Order update only

☐

Work Order: _____		DISPOSITION		AGAINST DEPARTMENT/PROCESS				Work Order update only ☐																																																																										
Part No. _____		Rework Scrap Use-as-is Suspected Unapproved		Skid-tube Machining Thermoforming Large Fab		Cross tube Small Fab Finishing Composite		Water Jet Prod. Eng. Coord. Rec/Store/Packaging Supplier																																																																										
NCR No. _____								Engineering Quality Other																																																																										
Date: _____		Step #: _____		QTY Effective: _____				MRB (QS1042) Approval																																																																										
Description Work Order Deviation				Disposition																																																																														
Root Cause				FAULT CATEGORY																																																																														
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				QC / QA Coordinator Approval																																																																														

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

Parent Item: D350-748-101

Parent Item Name: Fwd Crossube AS350 / AS355

163663
D350-748-101

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

243.0000

4

4

AN5-32A

Bolt

**

Location

Loc Qty

Loc Code

over004

120

m137853

120

ST336

123

m137320

3

m137464

120

220

Each

240.0000

8

8

AN4-41A

AN4-41A

Bolt

**

Location

Loc Qty

Loc Code

over003

161

m137464

41

m137544

120

ST342

79

m133769

2

m136851

37

m137320

40

220

Each

379.0000

16

16

Manufactured

No

D3501-1

Bushing

**

Location

Loc Qty

Loc Code

ST037

61

159311

61

ST038A

318

152871

0

161783

120

162915

198

Wednesday, July 05, 2017 10:24:14 AM

Shop Packet Print



DQA: _____ Date: _____
QA Closed: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Re-work ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐	
Date: _____		Step #: _____		QTY Effective: _____	
Description Work Order Deviation		Disposition			
		Completed By			
		Lead hand / Supervisor Approval Verification			
		QC / QA Coordinator Approval			

Root Cause		FAULT CATEGORY									
Environment	No Re-verification	Pressure/Forced	Temperature/Cure	Power Loss/ Surge	Positioned Wrong						
Design	Operator	Bending	Set-up	Folio/Program	Outside Dimensions						
Doc/Data	Offset/Setup	Centre Not Concentric	BOM/Route	Grain	Over/Under tolerance						
Equip/Tooling	Supplier	Cracks	Broken/Damage/Defect	Weld	Part Incorrect						
Handling/Pre	Training	Crimp/Kink/Ripple/Wave	Inspection Incomplete/Unqualified	Wrong Stock Pulled	Part Lost/Missing						
Material	Use for Testing	Cuffs	Contamination	Out of Sequence	Part Moved						
Internal Transport	Poor Information	Crushing	Countersink	Off-set	Drawing						
Tribal Knowledge	Rushing	Heat Treat	Cut Too Short	Mislabeled	Finish						
LOA	Product Improvement	Wave/Twist in Tube	Instructions Incomplete/Unclear	Fit/Function	Misread						
Substation	Process Improvement	Marks/Chatter	Drill Holes	Misaligned/off center	Turning Sequence						
Past Expiry Date	Manufacturing Process										
Misidentified	Past Due										
		OTHER: _____									



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date: _____		Step #: _____		QTY Effective: _____		MRB (QSI042) Approval	
Description Work Order Deviation				Disposition			
Root Cause				FAULT CATEGORY			
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐		
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐		
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Past Expiry Date ☐	Manufacturing Process ☐						
Misidentified ☐	Past Due ☐						
				OTHER: _____			
				Completed By			
				Lead hand / Supervisor Approval Verification			
				QC / QA Coordinator Approval			

Picklist Print

Wednesday, July 05, 2017 10:24:14 AM

Work Order ID: 163663

163663

Parent Item: D350-748-101

D350-748-101

Parent Item Name: Fwd Crosstube AS350 / AS355

Start Date: 7/5/2017

Required Date: 8/17/2017

Start Qty: 1.00

Required Qty: 1.00

NAS1149D0563J

Purchased

No

220

Each

1,548,000

8

8

NAS1149D0563.J

**

Washer

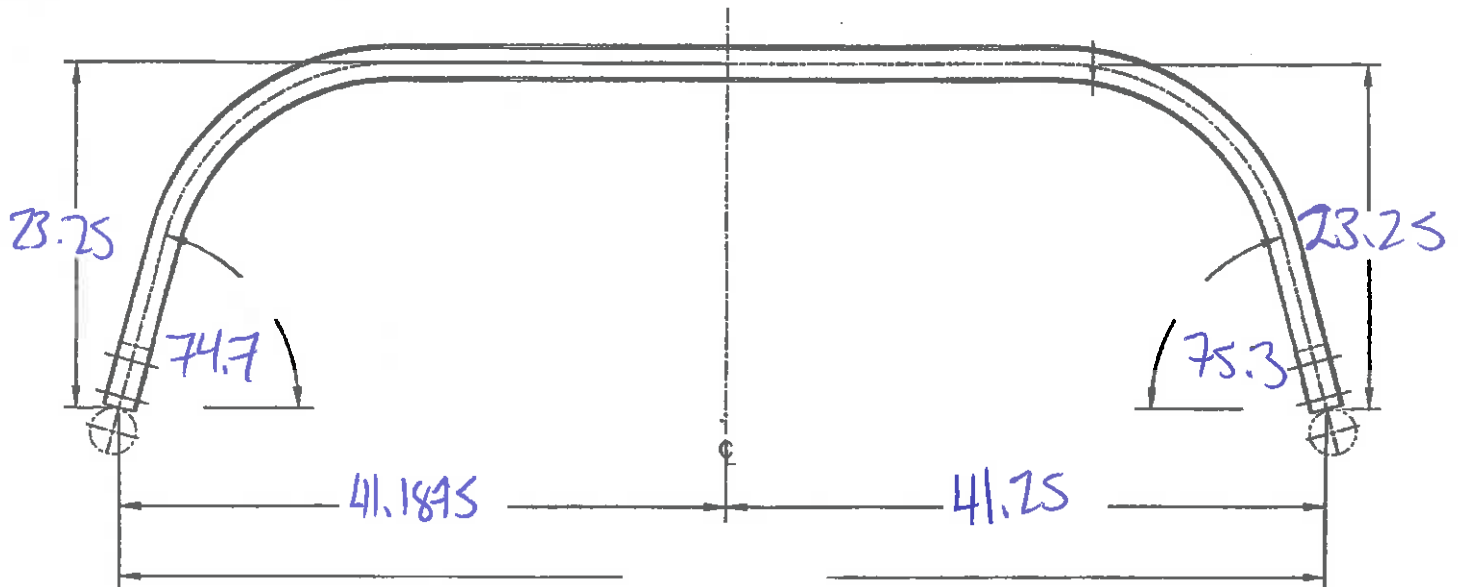
<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
GA	36	
ml35774	36	
ST260a	700	
ml37820	700	
ST263	812	
ml37587	812	

Work Order update only

Before De-stress

DART AEROSPACE LTD	Work Order:	163663
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: H		Page 1 of 1

Required Dimension	Min	Max
Height	23.00	23.50
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	--
Crushing	--	8%
Twist	--	0.38



	Side A	Side B
Bending Passes	36	36
Crushing		
Comments		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	
F	14.02.13	Crushing & twist dimensions revised	KJ	
G	14.11.10	Height dimension revised	KJ	
H	15.04.14	Dwg Rev updated	KJ	
I	15.09.09	Crushing dimension revised	KJ	

Item	Qty	Part Number	Description
1	X	D350-748-141	CROSS TUBE ASSEMBLY (AS 350/356 HI FWD)
2	1	D8015-125	CROSSTUBE (OR D8017-115)
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AE18-1082-228	INSERT
6	1	NA5114800383J	WASHER (OR AN680JID10)
7	2	MS21820-20	CLAMP (OR MS21820-21/-22, PER DART SPEC. M-)
8	1	MS27038-1-10	SCREW
9	A/R	PROSEAL 880 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D8015-125 OR D8017-115 FINISHED LENGTH AFTER TURNING = 112.2700.06 (AFTER BENDING/TRIMMING = 110.27 REF)
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART C81 008 4.2 CADMIUM PLATE PER AMS-QQ-4108, CLASS 1, TYPE II PRIME INSIDE AND OUTSIDE PER DART C81 005 4.2 PAINT OUTSIDE PER DART C81 005 4.2
- 3) TOLERANCE: PER DART C81 016 UNLESS OTHERWISE NOTED. WALL THICKNESS ECCENTRICITY PER DART C81 038 7.2 MIN. ALLOWABLE WALL IS 0.020 FROM NOMINAL.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER D350-748-141 AND BATCH NUMBER ON INSIDE OF CLIFF PER DART C81 044 8.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.287 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBRUING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 10) TURNING: BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-7-6738 OR AMS2758/1E AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) BENDING: ALL DIMENSIONS FOR BENT TUBE ARE POST STRESS RELIEF.
- 13) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 8% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- 14) MAX AMPLITUDE OF RIPPING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 15) AFTER BENDING, STRESS RELIEF TUBE AT 650°F ±0.25°F FOR A MINIMUM OF 2 HRS AND ALLOW TO COOL TO AMBIENT TEMPERATURE (REF AMS2758/1E).
- 16) MAX TWIST AFTER STRESS RELIEF: WITH TUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CLIFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).
- 17) ASSEMBLY: TO INSTALL D3502-1 SUPPORT, ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 880 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 18) TORQUE CLAMPS 80 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 880 SEALANT HAS CURED FOR 72 HOURS.

H	06123-1 WAS D8086-063-385, M821620-20 WAS -22, ALLOWABLE CRUSHING NOW 8% WAS 7% RIV ABRASION STRIP, SUPPORT NOW W/ PROSEAL & CUSHION, ADD STRESS RELIEF LONGER CLIFF, NOW TRIMD AFTER BEND, ADD WALL DIMS & UPDATE TOL.	CP	15.02.25
G	ADD HRC TEST OPTION (88-1) PER PAR 08-040, ADD TWIST LIMIT (88-1, C15), ADD D8015-125 OPTION (CP-1), STITCH DIM NOW MACHINED (D1-4)	CP	12.08.12
F	REVERSE GENERAL NOTES: UPDATE TO CURRENT ADD STANDARDS: RELOCATED FLAG #6 PER PAR 08-046 (ZN A4-3) TOLERANCES (ZN C8-3, D1-3)	CP	10.11.23
E	ADD CAD PLATING	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.05.14
B	ADD D8017-115 & PRIME AND PAINT	CP	09.03.30
A	NEW ISSUE	CP	06.10.31
REV.	DESCRIPTION	BY	DATE
DESIGN	DART AEROSPACE LTD		
DRAWN	HAMMERSBURY, ONTARIO, CANADA		
CHECKED	DRAWING NO.	REV. H	
MFG. APPR.	D850-748-141	SHEET 1 OF 4	
APPROVED	TITLE	SCALE	
DE APPR.	CROSS-TUBE (AS 360355 H FWD)	INTS	
DATE	15.02.25		

THIS DOCUMENT IS PROPERTY OF DART AEROSPACE LTD. IT IS TO BE KEPT IN CONFIDENCE AND NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM DART AEROSPACE LTD.

RELEASED
2015 MAR 18 *gjs*

DESIGN		02	DART AEROSPACE LTD	
DRAWING		02	HAWTHORNSBURG, ONTARIO, CANADA	
CHECKED		ALS	REV. H	
MFG. APPR.			D3507-748-141 SHEET 3 OF 4	
APPROVED		ALS	TITLE	
DE APPR.		02	CROSS TUBE (AS 350/255 HI FWD)	
DATE		15.02.25	DRAWN BY: DESIGNED BY: CHECKED BY: MFG. APPR. BY: APPROVED BY: DE APPR. BY: DATE:	



RELEASED

2015 MAR 18



DESIGN	00	PART AEROSPACE LTD	
DRAWING	00	HARRISBURG, ONTARIO, CANADA	
CHECKED	AS	DRAWING NO.	REV. H
MFG. APPR.	AS	DS50-748-141	SHEET 4 OF 4
APPROVED	AS	TITLE	SCALE
DE APPR.	AS	CROSS-TUBE (AS 302/356 H FWD)	INTS
DATE	15.02.25	COMPANYING 0.0001 BY PART AEROSPACE LTD	

THIS DOCUMENT IS THE PROPERTY OF PART AEROSPACE LTD. IT IS TO BE USED FOR THE PURPOSES SPECIFIED IN THE ORDER. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF PART AEROSPACE LTD.

THE CO-OPERATION BETWEEN THE TWO COMPANIES HAS BEEN THE KEY TO THE SUCCESS OF THE PROJECT. THE TWO COMPANIES HAVE BEEN WORKING TOGETHER SINCE THE BEGINNING OF THE PROJECT AND HAVE BEEN VERY SUCCESSFUL IN THE PAST. THE TWO COMPANIES HAVE BEEN WORKING TOGETHER SINCE THE BEGINNING OF THE PROJECT AND HAVE BEEN VERY SUCCESSFUL IN THE PAST.



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO36937**

Purchase Order Date 7/5/2017

PO Print Date 7/5/2017

Page Number 1 of 2

Order From :
METCOR INC.
560 BOUL. ARTHUR SAUVE
SAINT-EUSTACHE, QC J7R 5A8
CA

VC-MET004

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name
Vendor Phone 450 473 1884

Ship To Contact
Ship To Phone
Ship Via: Dart Truck
Ship Acct:

Buyer Chantal Lavoie
Customer POID
Customer Tax # 10127-2607
Terms Net 30
Currency CAD
FOB FCA - (Free Carrier)

Line Nbr	Reference Vendor Part Number Line Comments Delivery Comments	Description/ Mfg ID	Req Date/ Taxable Promise Date	CD	Req Qty/ Unit of Measure	PO Unit Price	Extended Price
1	163187	D350-748-101 CROSSTUBE	7/6/2017 Yes 7/6/2017 HEAT TREAT CROSSTUBE AS PER QSI 010 4.3 WITHIN 12HOURS AFTER BENDING		1.00	\$250.00	\$250.00
						Line Total:	\$250.00
2	163188	D350-748-101 CROSSTUBE	7/6/2017 Yes 7/6/2017 HEAT TREAT CROSSTUBE AS PER QSI 010 4.3 WITHIN 12HOURS AFTER BENDING		1.00	\$250.00	\$250.00
						Line Total:	\$250.00
3	163663	D350-748-101 CROSSTUBE	7/6/2017 Yes 7/6/2017 HEAT TREAT CROSSTUBE AS PER QSI 010 4.3 WITHIN 12HOURS AFTER BENDING		1.00	\$250.00	\$250.00

Note:

7/5/2017

8017-7-6

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Reçu de livraison

Delivery Receipt

BON DE TRAVAIL Order	EXPÉDITEUR Shipper ID	BON D'EXPÉDITION Shipper
320367	1	120684

EXPÉDITION COMPLÈTE / Shipped Complete

CLIENT /Customer 215

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053



LIVRÉ À /Shipped To

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053

COMMANDE DU CLIENT Customer PO	BON DE LIVRAISON DU CLIENT Customer Shipper No.	TYPE DE MATÉRIEL Material Type	DATE DE LA COMMANDE Order Date	TRANSPORTEUR Carrier
36937		Steel	2017/7/5	client

QUANTITÉ Quantity	No. PIÈCE / Part No.	NOM DE LA PIÈCE / Part Name	DESCRIPTION DE LA PIÈCE Part Description	POIDS Weight
----------------------	-------------------------	--------------------------------	---	-----------------

4 D350-748-101

CROSSTUBE

(1) D350-748-101 163187

(1) D350-748-101 163188

(1) D350-748-101 163663

(1) D350-748-101 163664

1 NIL

124,

SP17-7-6

TYPE DE CONTENEUR Container Type	# DE CONTENEURS # Of Containers	COMMENTAIRES CONTENEUR Container Comments
NIL	1	

CERTIFICAT

EMPAQUETAGE Packing	
------------------------	--

QUANTITÉ EXPÉDIÉE / Quantity Shipped : 4

POIDS EXPÉDIÉ / Weight Shipped : 124,00

QUANTITÉ RESTANTE / Quantity Remaining : 0

POIDS RESTANT / Weight Remaining : 0,00

CERTIFICAT

QUANTITÉ EXPÉDIÉE / Quantity Shipped : 4

POIDS EXPÉDIÉ / Weight Shipped : 124,00

Signature:

Date:

EXPÉDIÉ LE / Shipped On : 2017/07/06

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité

Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
320367	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K8A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K8A 1K7

1

COMMANDE DU CLIENT customer po	CLASSIFICATION PIECE part classification	MATÉRIEL material	MAÎTRE D'OEUVRE prime contractor	PROGRAM
36937	N/A	Steel		

SPÉCIFICATIONS DU PROCÉDÉ processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

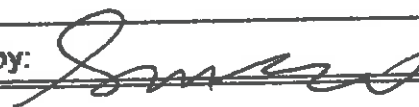
EXIGENCE / requirement	SPÉCIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
4	124	D350-748-101 CROSSTUBE (1) D350-748-101 163187 (1) D350-748-101 163188 (1) D350-748-101 163663 (1) D350-748-101 163664 1 NIL

SP 17-7-6
65012

COMMENTAIRES / comments

APPROUVÉ par / Approved by:



DATE: 2017-07-06

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
320367	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	CLASSIFICATION PIECE part classification	MATÉRIEL material	MAÎTRE D'OEUVRE prime contractor	PROGRAM
36937	N/A	Steel		
SPECIFICATIONS DU PROCÉDÉ processing specifications				
STRESS REL				
SAE AMS 2759/1 REV.E				
EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results				
Visual				
QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description		
4	124	D350-748-101 CROSSTUBE (1) D350-748-101 163187 (1) D350-748-101 163188 (1) D350-748-101 163663 (1) D350-748-101 163664 1 NIL		

COMMENTAIRES / comments

STRESS RELIEF 650F, 2 HRS

Le traitement thermique (TT) a été fait en utilisant des équipements en conformité avec AMS2759 et AMS 2750. Le TT a été fait tel que requis par AMS2759 et toutes les vérifications et les tests demandés ont été faites et documentés. Aucun changement n'a été faite par rapport au TT. On certifie que le matériel a été fabriqué, échantillonné, testé et inspecté en accord avec AMS2759 et le bon de commande et le matériel rencontre les exigences spécifiées.

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Heat treatment (HT) was performed with equipment that meets the requirements of AMS2759 & AMS2750. All HT operations were in compliance with AMS2759 and all verifications have been performed and documented. No unauthorized changes were performed in regards to the HT. We certify that the material was manufactured, sampled, tested and inspected in accordance with AMS2759 and the purchase order and was found to meet the requirements.

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METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité Détail

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
320367	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

export or re-export is prohibited.

APPROUVÉ par / Approved by:

Isabel Otero

Isabel Otero

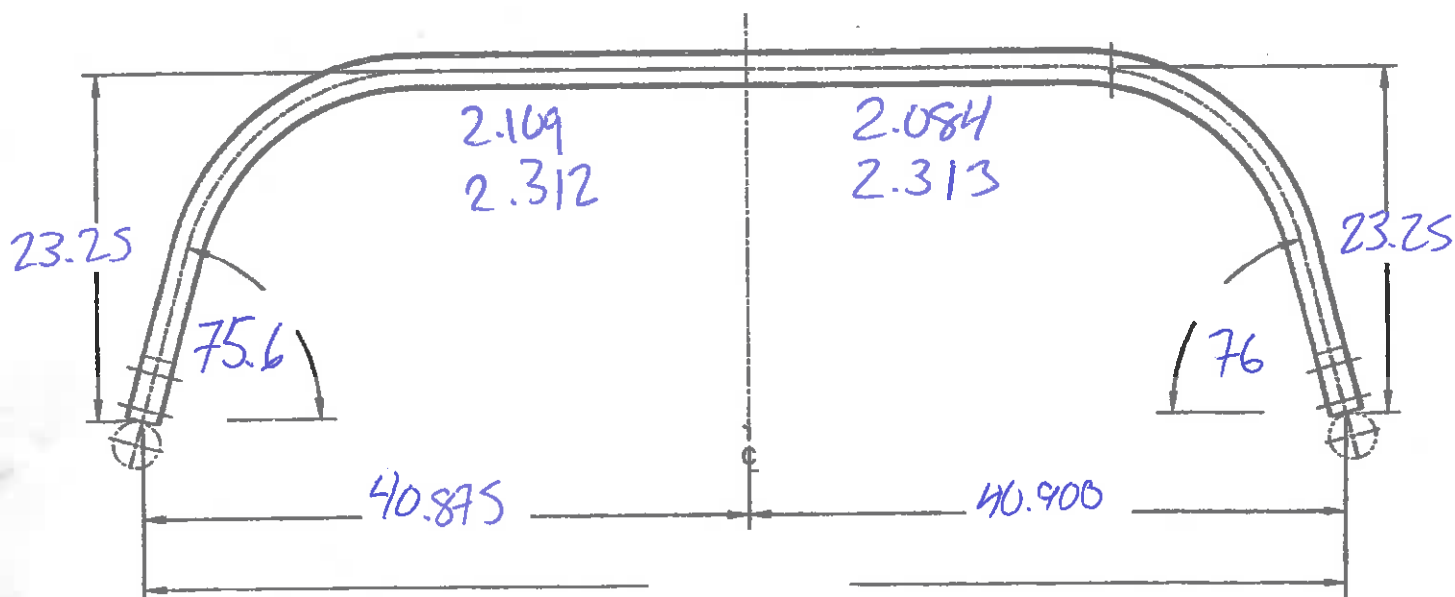
QA Technician

DATE: 2017-07-06



DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: H		Page 1 of 1	

Required Dimension	Min	Max
Height	23.00	23.50
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	—
Crushing	—	8%
Twist	—	0.38



	Side A	Side B
Bending Passes	36	36
Crushing	4.6%	5.2%
Comments		

QC15 Inspection	DAS 38 0-89
Date	JUL 11 2017

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	
F	14.02.13	Crushing & twist dimensions revised	KJ	
G	14.11.10	Height dimension revised	KJ	
H	15.04.14	Dwg Rev updated	KJ	
I	15.09.09	Crushing dimension revised	KJ	

PSI. S.
SIE. S.



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID PO37045

Purchase Order Date 7/13/2017

PO Print Date 7/20/2017

Page Number 7 of 9

Order From :

CADORATH COATING
2150 LOGAN AVE.
WINNIPEG, MB R2R 0J2
CA

VC-CAD002

Ship To : DART AEROSPACE LTD

1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name

Vendor Phone

204 633 9420

Ship To Contact

Ship To Phone

Ship Via:

Ship Acct:

Journey Freight collect

Buyer

Customer POID

Customer Tax #

Terms

Currency

FOB

Diane Baker

10127-2607

Net 30

CAD

Destination-Collect

13 163663

D350-748-101 Fwd
Crosstube AS350 / AS355

7/24/2017

Yes

7/24/2017

1.00

\$803.42

\$803.42

Stress relief at 375degree for 5hrs
Magnetic Particle Inspect per ASTM E1444
Cad Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375 degree for 8 hrs, Chromate Treat
C of C req'd

DAS
38
9-85

Line Total:

\$803.42

14 163664

D350-748-101 Fwd
Crosstube AS350 / AS355

7/24/2017

Yes

7/24/2017

1.00

\$803.42

\$803.42

Stress relief at 375degree for 5hrs
Magnetic Particle Inspect per ASTM E1444
Cad Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375 degree for 8 hrs, Chromate Treat
C of C req'd

Line Total:

\$803.42

Note:

7/20/2017

Packing Slip

Page 1 of 2



Cadorath Coating

2150 Logan Avenue, Winnipeg, Manitoba R2R-0J2

Phone: (204) 633-9420 Fax: (204) 633-8033

INVOICE NUMBER:

S90743

Net 2% Interest Per Month charged on Overdue Accounts.

Any claims for shortages, overcharges, or damaged goods must be made within seven (7) days from receipt of goods.

Sold To:
Dart Aerospace Ltd.
1270 Aberdeen St.

Hawksbury, ON K6A 1K7

ShipTo:

Customer Order #: 37045
Date Received: Jul-18-2017

Terms: NET 30 DAYS
G.S.T. #: 10071 6547 RT0001

Ship Via:

Ship Date: Jul-24-2017

Item #	Qty	P/N & Description	
1	1 EA	CROSSTUBE	S/N 163664
		P/N d350-748-101	W/O 172796
2	1 EA	CROSSTUBE	S/N 163663
		P/N d350-748-101	W/O 172797
3	1 EA	CROSSTUBE	S/N 163660
		P/N D350-748-201	W/O 172803
4	1 EA	CROSSTUBE	S/N 163184
		P/N d350-748-101	W/O 172790
5	1 EA	CROSSTUBE	S/N 163185
		P/N d350-748-101	W/O 172791
6	1 EA	CROSSTUBE	S/N 163183
		P/N d350-748-101	W/O 172792
7	1 EA	CROSSTUBE	S/N 163186
		P/N d350-748-101	W/O 172793
8	1 EA	CROSSTUBE	S/N 163665
		P/N d350-748-101	W/O 172794
9	1 EA	CROSSTUBE	S/N 163188
		P/N d350-748-101	W/O 172795
10	1 EA	CROSSTUBE	S/N 161645
		P/N D350-748-201	W/O 172798
11	1 EA	CROSSTUBE	S/N 161647
		P/N D350-748-201	W/O 172799
12	1 EA	CROSSTUBE	S/N 163180
		P/N D350-748-201	W/O 172800

SP177-25

